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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/872,970	06/01/2001	James M. Reuter	P01-3667	3048

22879 7590 06/27/2005

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EXAMINER	
CHANKONG, DOHM	

ART UNIT	PAPER NUMBER
2152	

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/872,970	REUTER ET AL.	
	Examiner	Art Unit	
	Dohm Chankong	2152	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1> This action is in response to Applicant's arguments. Claims 1-35 are presented for further examination.

2> This action is a non-final rejection.

Response to Arguments

3> Applicant's arguments with respect to claims 1-35 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4> Claims 24-26 and 30 are rejected under 35 U.S.C § 102(e) as being anticipated by Kricheff et al, U.S Patent No. 6.324.627 ["Kricheff"].

5> As to claim 24, Kricheff discloses a method for performing an operation on a virtual disk coupled to a host within a network, comprising:

specifying a block on the virtual disk within the operation [column 4 «line 65» to column 5 «line 22» | column 7 «lines 39-47»];

accessing a table mapping the block to a storage location on a storage device [column 4 «line 65» to column 5 «line 22» | column 8 «lines 2-59»];

issuing a corresponding operation to the storage device, wherein the corresponding operation correlates to the operation on the virtual disk [column 4 «line 65» to column 5 «line 22» | column 8 «lines 2-59»];

completing the corresponding operation [column 4 «line 65» to column 5 «line 6»].

presenting the completed corresponding operation to the virtual disk [column 7 «lines 39-58» | claim 1].

6> As to claim 25, Kricheff discloses the method of claim 24 wherein the issuing step includes issuing the corresponding operation from an agent coupled to the host [Figure 3 «item 8» where : all commands from the processor go through the agent (Kricheff's disk controller)].

7> As to claim 26, Kricheff discloses the method of claim 24, further comprising updating the table with a persistent-stored table residing in a non-volatile memory [column 11 «lines 6-11» where : the VDS controller updates the memory of the computer system with the generated mapping table].

8> As to claim 30, Kricheff discloses the method of claim 24 further comprising receiving updates for the table from a controller [column 11 «lines 6-11» where : the VDS controller updates the memory of the computer system with the generated mapping table].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9> Claims 1-40 are rejected under 35 U.S.C § 103(a) as being unpatentable over Blumenau et al, U.S Patent No. 6.260.120 ["Blumenau"] in view of Casorso et al, U.S Patent No. 5.404.361 ["Carsorso"].

10> As to claim 1, Blumenau discloses a virtual storage system for linking a host to one or more storage devices over a network, the system comprising:

an agent connected to the host [Figure 4 «items 61, 62, 63» where : Blumenau discloses a controller connected to the host, this controller being equivalent to an agent], the agent having volatile memory for storing a first copy of a table, the table having entries to map virtual addresses (ports) to locations on the storage devices [Figure 4 «items 27, 80» | Figures 22, 23, 24, 25 | column 25 «lines 50-56» | column 32 «lines 43-45»]; and

a controller coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table [Figure 21 «item 27» | column 32 «lines 43-54» where : the copy of the mapping information is stored in the storage system which contains the storage controller. The host is able to access the table on the controller if his is not available];

whereby during an I/O operation, the host accesses one of the entries in the table stored on the agent to determine one of the storage device locations [column 25 «lines 50-58» | column 26 «lines 28-36» where : Blumenau discloses a "volume access and mapping table". Therefore the mapping table is accessed whenever a volume needs to be accessed].

Blumenau discloses mapping virtual ports (addresses) to physical locations on a drive but does not explicitly disclose mapping virtual disk positions on the storage device.

11> In a same field of invention [Figure 1], Casorso is directed towards providing error check functionality to a dynamically mapped storage system. Additionally Casorso discloses a mapping table, the table having entries to map virtual disk positions to locations on the storage devices [column 1 «lines 37-42» | column 3 «lines 18-38» | column 6 «lines 60-66» | column 8 «lines 5-23»]. It would have been obvious to one of ordinary skill in the art to modified Blumenau's mapping table with the functionality of Casorso's mapping table to enable the mapping of the virtual disk positions to their counterparts on the physical drive. The benefits of such a mapping are well known in the art such as providing a level of

abstraction to the a host processor for accessing the storage system [see column 3 «lines 34-37»].

12> As per claims 2 and 3, Blumenau teaches the table entries further include an indication whether a private state is activated such that the private state for a table entry becomes activated when that table entry contains no shareable mapping information. Data in the particular storage location is restricted from shared, read/write access (fig. 8). Blumenau does not explicitly teach invalid state. However, it would have been obvious to one of ordinary skill in the art to modify the teachings of Blumenau to restrict access to a particular portion of the storage location by making the entry state invalid. One of ordinary skill in the art would have been motivated to add this function to restrict unauthorized access to private data that the user do not want others to see or share.

13> As per claims 4-5, Blumenau teaches the table entries further include an indication of whether a no-write state is activated such that the no-write state for one of the entries becomes activated when data cannot be written to the storage location contained in that entry (col. 19, lines 15-21).

14> As per claims 6-7, Blumenau teaches the communication channel (21, fig. 1) to couple the agent and the controller, wherein communication channel employs a data transfer protocol to transport messages on the communication channel (col. 2, lines 19-22).

15> As per claims 8-11, Blumenau teaches the entries include an offset, wherein the offset includes logic unit number identifier (fig. 25, col. 27, Lines 23-24., virtual disk mapping table) and a block identifier (fig. 34), and the entries further includes a segment of virtual disk positions (fig. 8).

16> Claims 12-21 are rejected for similar reasons as claims 1-5 and 8-11. Blumenau further teaches a plurality of variables such as private/share (fig. 8) and write/no-write Boolean states of the entry (col. 19, Lines 15-21). Blumenau also teaches the data frame (block) is about 1 MB (fig. 34). Furthermore, the designation of the size of the data block is merely a design choice. It is well known in the art to assign the data block to any arbitrary size and does not provide any patentable distinction over the prior art.

17> As per claims 22-23, Blumenau teaches the states include a zero state (col. 22, lines 10-12, null state initially has a zero or null value) and an error state (col. 12, line 20).

18> As per claims 24-25, Blumenau teaches a method for accessing the logical volume on a virtual disk (26, fig. 1) by the host controller (61, fig. 4., host controller is functionally equivalent to agent) coupled to the host (20, fig. 1) within a network (21, fig. 1), comprising: specifying a block (logical unit number or LUN) on the virtual disk

(through virtual port - volume 1) within the operation, accessing a table mapping (Figures 23-25) the virtual address to a storage location on a storage device, issuing a corresponding operation to the storage device (part of storage subsystem) (column 8, lines 48-65 where : the operation is a read operation of the storage device), wherein the corresponding operation correlates to the operation on the virtual address (column 25 «lines 50-58» | column 26 «lines 28-36»); completing the corresponding operation', and presenting the completed corresponding operation to the virtual address (column 8 «lines 48-65», column 33 «lines 1-23 and 42-60»).

Blumenau discloses mapping virtual ports (addresses) to physical locations on a drive but does not explicitly disclose mapping virtual disk positions on the storage device.

19› In a same field of invention [Figure 1], Casorso is directed towards providing error check functionality to a dynamically mapped storage system. Additionally Casorso discloses a mapping table, the table having entries to map virtual disk positions to locations on the storage devices [column 1 «lines 37-42» | column 3 «lines 18-38» | column 6 «lines 60-66» | column 8 «lines 5-23»]. It would have been obvious to one of ordinary skill in the art to modified Blumenau's mapping table with the functionality of Casorso's mapping table to enable the mapping of the virtual disk positions to their counterparts on the physical drive. The benefits of such a mapping are well known in the art such as providing a level of abstraction to the a host processor for accessing the storage system [see column 3 «lines 34-37»].

20> As per claims 26-27, Blumenau teaches updating the table with a persistently-stored table residing in a non-volatile memory (88, fig. 7, col. 16, Lines 27-30) and determining states of the table (fig. 8., storage controller can restrict or permit volume access by host controller by setting the flag to either private or share Boolean states).

21> As per claim 28, Blumenau teaches sending a fault message when the table is unable to be accessed (187, fig. 17).

22> Claim 29 is rejected based on similar reasons as claim 1 addressed above.

23> As per claim 30, Blumenau teaches the storage controller sends updated information of the entries in the mapping table to host controller (agent) (col. 22, Lines 44-47., col. 24, Lines 64 - col. 25, lines 7).

24> Claims 31-33 are rejected for similar reasons as claim 30 addressed above. Blumenau further teaches activating states within entries of the table (fig. 8). Blumenau does not explicitly teach setting a blocking flag until operations are completed. It is known the art while data transfer (writing) is taken place between a host and a particular Location of the storage device, one of ordinary skill in the art would be motivated to refrain from accessing the same blocks of data because it may interfere with the data writing that is taken place that may corrupt the data or cause the system to "hang" until the operations are

completed. Additionally, Blumenau discloses a "locking" feature within his storage system that is analogous in functionality to a blocking flag [column 19 «lines 15-21»].

25› Claims 34-35 are rejected for similar reasons as claims 24-25 and 31-33 addressed above.

26› As per claims 36-38, Blumenau teaches the volume access mapping table has the flexibility in assigning a variable number of volumes to each group of blocks of contiguous memory locations (fig. 5, col. 15, Lines 42-48).

27› As per claims 39-40, Blumenau teaches the table entry comprises a beginning and ending data frames (blocks) (fig. 34).

28› Claims 1 and 8 -11 are rejected under 35 U.S.C § 103(a) as being unpatentable over Kricheff.

29› As to claim 1, Kricheff discloses a virtual storage system for linking a host to one or more storage devices over a network, the system comprising:

an agent connected to the host [Figure 3 «item 8»], the agent storing a first copy of a table, the table having entries to map virtual disk positions to locations on the storage devices [column 8 «lines 6-18» | column 11 «lines 6-11»]; and

a controller coupled to the agent [Figure 3 «item 12»], the controller having non-

volatile memory for storing a second copy of the table [column 11 «line 36» to column 12 «line 10»] , the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table [column 11 «lines 6-16»],

whereby during an input/output (I/O) operation, the host accesses one of the entries in the table stored on the agent to determine one of the storage device locations [column 7 «lines 48-58» | column 8 «lines 20-29»].

Kricheff discloses storing the first copy of the table in the computer system [column 11 «lines 6-11» where : it would have been obvious to consider the disk controller (agent) as part of the host computer system] but does not explicitly disclose volatile memory. However, Kricheff explicitly states that the VDS controller essentially updates the memory of the computer system with new mapping tables. Therefore, the memory is implicitly volatile otherwise, the VDS controller would be unable to write to the computer system's memory.

30› As to claims 6 and 7, Kricheff discloses the system of claim 1, further comprising a communication channel to couple the agent and the controller [Figure 3 «item 14»], wherein the communication channel employs a data transfer protocol to transport messages on the communication channel [column 5 «lines 33-40 and 46-49» | column 6 «lines 37-48»].

31› As to claims 8 -11, Kricheff discloses the system of claim wherein the entries include an offset [column 8 «lines 6-19»], the offset includes logic unit number identifier and a block

identifier [column 8 «lines 6-55»], and wherein the entries further includes a segment of the virtual disk positions [column 8 «lines 6-19»].

32> Claims 2-5 are rejected under 35 U.S.C § 103(a) as being unpatentable over Kricheff, in view of Blumenau.

33> As to claims 2 and 3, Kricheff does not explicitly disclose an invalid entry.

34> Blumenau teaches the table entries further include an indication whether a private state is activated such that the private state for a table entry becomes activated when that table entry contains no shareable mapping information. Data in the particular storage location is restricted from shared, read/write access (fig. 8). Blumenau does not explicitly teach invalid state. However, it would have been obvious to one of ordinary skill in the art to modify the teachings of Blumenau to restrict access to a particular portion of the storage location by making the entry state invalid. One of ordinary skill in the art would have been motivated to add this function to restrict unauthorized access to private data that the user do not want others to see or share. It would have been further obvious to modify Kricheff's table entries to include Blumenau's invalid entry to restrict access to disks that are otherwise faulty or offline.

35> As per claims 4-5, Kricheff does not explicitly disclose a no-write state.

36> Blumenau teaches the table entries further include an indication of whether a no-write state is activated such that the no-write state for one of the entries becomes activated when data cannot be written to the storage location contained in that entry (col. 19, lines 15-21). It would have been obvious to one of ordinary skill in the art to modify Kricheff's table to include Blumenau's no-write state to protect entries from being overwritten. The benefits of such functionality is well known in the art.

37> Claims 12-23, 27-29 and 31-40 are rejected under 35 U.S.C § 103(a) as being unpatentable over Kricheff, in view of Murata et al, U.S Patent No. 5.390.186 ["Murata"].

38> As to claim 12, Kricheff discloses a system for mapping a virtual disk segment to a storage location within a storage device, such that a host issues a I/O operation to an agent and the agent determines said storage location for input/output operations, said system comprising:

a table having an entry corresponding to said storage location [column 8 «lines 6-19»];

an offset for the entry, wherein the offset includes a logic unit number identifier and a block identifier [column 8 «lines 6-59»]; and

a memory to store the table [column 11 «lines 6-11»].

Kricheff does not explicitly disclose a plurality of variables indicating states of the entry.

39> However, including variables to indicate states of an entry within a table are ubiquitous and well known in the art. For example Murata discloses such functionality in his table [Figure 2]. It would have been obvious to one of ordinary skill in the art to have incorporated Murata's status identifiers and variables into Kricheff's mapping table to help indicate the status of the disk drives to the host processor.

40> As to claim 13, Kricheff discloses storing the first copy of the table in the computer system [column 11 «lines 6-11» where : it would have been obvious to consider the disk controller (agent) as part of the host computer system] but does not explicitly disclose volatile memory. However, Kricheff explicitly states that the VDS controller essentially updates the memory of the computer system with new mapping tables. Therefore, it would have been obvious to implement the memory as volatile otherwise, the VDS controller would be unable to write to the computer system's memory.

41> As to claim 14, Kricheff discloses the system of claim 12, wherein said storage location comprises a block of data within the storage device [column 8 «lines 6-19»].

42> As to claim 15, Kricheff does not explicitly disclose the size of the data block. However, specifying the size of the block is merely a design choice and is not reflective of any patentable distinction over the prior art. It would have been obvious to one of ordinary skill in the art to have implemented Kricheff's data block as 1 megabyte or any other size.

43> As to claim 16, Kricheff discloses the system of claim 12 wherein the agent is coupled to the host [Figure 3].

44> As to claims 17-23, Kricheff does not explicitly disclose the plurality of variables.

45> Murata discloses a plurality of variables comprising Boolean variables [Figure 2 where: "0" and "1" represent the true/false], the states include an no-write state [Figure 2 where : physical lock represents a lock on the disk drive], the plurality of variables includes a variable for the no-write state [Figure 2 : "locked", "unlocked"], the states include a zero state [Figure 2 | column 5 «lines 12-32»] and an error state [Figure 2 : "review needed"]. Murata does not explicitly disclose an "invalid state" or invalid variable however this is a mere variation to the states and variables described in Murata. Additionally the use of invalid state and variables are well known in the art as a signal to the host that a disk drive is proper. Therefore it would have been obvious to one of ordinary skill in the art to have modified Kricheff to include the variables and states specified in Murata to increase the functionality of Kricheff's table enabling a wider variety of alerts to the host processor concerning the disk drives.

46> As to claim 27, Kricheff does not discloses determining states of the table.

47> Murata discloses determining states of the table [Figure 2 | column 5 «lines 41-48»]. It would have been obvious to one of ordinary skill in the art to incorporate Murata's

determination functionality into Kricheff's table to enable the processor to determine the status of the table.

48› As to claim 28, Kricheff does not disclose sending a fault message.

49› Murata discloses sending a fault message when the table is unable to be accessed (error) [abstract | column 2 «lines 29-54»]. It would have been obvious to one of ordinary skill in the art to modify Kricheff's mapping system to include Murata's fault message capabilities to enable safer handling of data stored on a disk drive.

50› As to claim 29, Kricheff discloses storing the first copy of the table in the computer system [column 11 «lines 6-11» where : it would have been obvious to consider the disk controller (agent) as part of the host computer system] but does not explicitly disclose volatile memory. However, Kricheff explicitly states that the VDS controller essentially updates the memory of the computer system with new mapping tables. Therefore, it would have been obvious to implement the memory as volatile otherwise, the VDS controller would be unable to write to the computer system's memory.

51› As to claims 31-33, as they do not teach or further define over the limitations of claims 12, 20 and 24, they are similarly rejected for the same reasons [a "blocking flag" is analogous to a no-write state in that no data is permitted to be written to the disk drive; the no-write state was discussed in the rejection of claim 20].

52> Claims 34-35 are rejected for similar reasons as claims 24-25 and 31-33 addressed above.

53> As to claims 36 and 37, Kricheff discloses a storage location and table entry composed of variable sized blocks of contiguous virtual disk blocks [column 8 «line 6» to column 9 «line 39»].

54> As to claim 38, Kricheff discloses a contiguous virtual disk blocks map to contiguous blocks on a physical storage container [column 8 «lines 6-19»].

55> As to claims 39-40, Kricheff discloses a beginning and ending block [column 8 «line 6» to column 9 «line 14»].

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Blea et al, U.S Patent No. 6.212.531;

Ofek et al, U.S Patent No. 6.385.706.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dohm Chankong whose telephone number is (571)272-3942. The examiner can normally be reached on 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess can be reached on (571)272-3949. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DC

Dung C. Dinh
Primary Examiner